Extracting Firms' Willingness to Pay Foreign Workers: Allocating H-1B Visas by Auction

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Abstract

We study how the distribution of H-1B visas across publicly traded firms would change with an alternative allocation mechanism (a second-price auction), and assess the associated gain in revenues for the U.S. government. Our counterfactual allocations show that only 25% of the firms using H-1B visas under the current system would submit successful bids. H-1B visas would become highly concentrated among software and high-tech companies, while management and IT consulting firms would experience the biggest drop in H-1B employment. Even when complementarities between domestic and H-1B workers are ruled out, we find an average winning bid of $\$32,947$ (roughly 5 times the current fee), suggesting large revenue gains for the government from implementing the auction.

JEL Classification: J61, D22, C57

Keywords: H-1B Visa, Willingness to Pay, Nash Bargaining

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1 Introduction

The H-1B visa program allows firms in the United States to employ foreign workers in occupations requiring specialized knowledge, holding a bachelor's degree or higher in their field of expertise. Every year the total amount of new H-1B visa is capped by Congress, and if the number of new H-1B applications exceeds this limit, the visas are currently allocated with a lottery over all petitioners. In this paper, we study how the allocation of H-1B visas across publicly listed companies would change if firms were allowed to bid for their visas in a second-price auction. We find that software and "high-tech" companies (e.g. biotechnology, semiconductor and telecommunications equipment) would have the highest willingness to pay for visas. Noticeably, some of the largest employers of H-1B visas in the IT consulting sector would drastically reduce their participation in the program. Our estimates suggest the potential for substantial revenue gains for the government from switching to this allocation mechanism: even when we rule out complementarities in production between foreign and domestic workers, we find counterfactual winning bids averaging $\$32,947$ over the 2014-2017 period (roughly five times larger than the current filing fees).

We build a new firm-level dataset combining several sources. From Compustat fundamentals, we take annual data on sales, employment and capital for publicly listed firms in the United States over the 2012-2017 time period. We also use firm-level data on H-1B approved petitions, wages and individual workers' characteristics, which we have obtained with a Freedom of Information Act request to the United States Citizenship and Immigration Services (USCIS). We combine this information with the Bureau of Labor Statistics' Occupational Employment Statistics data on industry turnover rates to build an estimate of the stock of H-1B workers per firm over the 2014-2017 period.

We estimate a basic search-model in which H-1B visa workers and firms bargain over the surplus generated by their employment relationship. Firms can either hire in the domestic or H-1B labor markets, which are characterized by different search costs. When an H-1B worker is selected, her wage is determined as the outcome of Nash-bargaining over the marginal product of her labor.

The marginal product of labor for H-1B and domestic workers is obtained by estimating

a CES production function, in which we allow for imperfect substitution between inputs. We exploit the fact that, over the 2014-2017 time horizon, new H-1B visa applications have exceeded the congressionally mandated cap, resulting in lottery allocations, and build an instrument (the "surprise number of H-1B visa") for H-1B firm-level employment. We use our detailed information on individual wages of H-1B workers to jointly estimate the production function and Nash-Bargaining parameters.

Given the marginal product of labor inputs, we take a revealed preference approach to infer search costs. We start from the assertion that any time a firm hires an H-1B worker, the surplus generated must exceed what would be obtained by searching in the domestic market. This surplus is minimized when a firm hires the highest paid H-1B workers, implicitly revealing the search cost differential between domestic and H-1B hiring market. Intuitively, if a firm is willing to pay much more for an H-1B worker compared to its equivalent domestic worker in the same occupation, it must be that search cost in the domestic market exceeds its equivalent in the H-1B visa market. A firm's willingness to pay for an H-1B visa is simply obtained as the difference in surplus between hiring a worker on the H-1B market and on the domestic market.

We finally proceed to simulate a second-price auction for the allocation of H-1B visas. Firms start from their initial stock of H-1B workers at the end of 2013, which we calculate as the sum of approved H-1B petitions over 2012 and 2013 (net of turnover), for which the visa lottery was not implemented, due to the aggregate amount of new applications being below the annual cap. We then simulate for each firm random matches with foreign workers, drawn from the empirical firm-distribution of H-1B visa. In particular, matches are generated for any given occupation in which we observe a firm hiring H-1B workers in the data, allowing for potential complete replacement of the existing domestic workforce in such occupations. For each match, firms are allowed to submit a bid in a standard second-price auction. As firms win bids and replace existing workers, the marginal product of an additional H-1B worker decreases, progressively reducing the willingness to pay for additional H-1B visas.
Our estimates consistently show across occupations that firms facing the highest search cost in the domestic labor market (relative to the H-1B pool) tend to be in software and "high tech" sectors. This is consistent with the narrative that such companies tend to demand

skills whose supply is relatively scarce in the domestic labor market. Such firms tend also to be the ones for which the marginal product of labor is the highest in our sample, leading to higher willingness to pay for visas. IT consulting companies tend to pay existing H-1B visa workers lower wages than their domestic counterparts. This implies modest search cost differentials, which drives their lower willingness to pay.

Our policy counterfactual experiments show a marked increased in the allocation of visas for electrical engineers, managers, and computer related occupations, with Google, Ebay and IBM experiencing the largest increases in participation to the H-1B visa program (from roughly 5,000 aggregate approved petitions to over 26,000 in 2014), while Atos Syntel, Intel and Cognizant Solutions would lose a total of roughly 21,000 visas. It is worth noting also that, in the counterfactual, the number of firms that obtain H-1B visa shrinks to 44, compared to 244 public firms receiving visas in the data. In other words, the auction would result in a dramatic rise in concentration of H-1B visa among the most productive firms in the economy.

We finally provide an estimate of the gain in revenues for the US government from implementing the auction. We analyze the benchmark case of perfect substitution between domestic and H-1B workers. By neutralizing complementarities between these inputs, we can obtain a reasonable lower bound for the firms' willingness to pay. We obtain that a winning bid of $34,277 in 2014, with aggregate revenues of $1.75 billion, which is roughly 5 times as large compared to the current revenue from the H-1B visa fees.

1.1 The H-1B Visa Program: Background and Data

New applications for H-1B visas are capped by the United States congress to 65,000 for private-sector employers, in addition to 20,000 visa reserved to applicants holding advanced degrees (e.g. Masters and PhDs; employment of H-1B in universities and non-profit institutions is exempt from these caps). H-1B visas are valid up to 3 years, and can be renewed once (renewals are not subjected to the congressional cap). In order to obtain an H-1B visa for a foreign job candidate in a specialty occupation, employers submit a labor condition application (LCA) together with their H-1B visa petition up to 6 months before the starting date of the employment relationship (which is set at the beginning of the government's fiscal

year, in October). USCIS reviews new petitions starting April 1st of each year, and if the number of petitions received exceeds the congressional cap, H-1B visas are assigned with a lottery. Once an H-1B petition is successfully awarded to a firm, the related processing fee is collected, while petitions not awarded a visa are returned, without any fee collection.

Our dataset includes approved H-1B petitions over the 2012 to 2017 fiscal years. In 2012 and 2013, the annual Congressional quota on H-1B visa was not reached by April 1st, and so all new H-1B visas were assigned on a first-come first-served basis. Since 2014 the quota has been reached in advance of the filing deadline, and H-1B visa have been assigned through lottery. We matched this information on approved petitions with data from 246 publicly listed firms on total employment, sales, and capital from Compustat.

It is important to point out that the number of approved petitions does not necessarily coincide with the actual amount of H-1B employees at a given firm and fiscal year, given that we have no direct information on terminations of employment or employer-to-employer transitions (either voluntary or involuntary). Since for every new employment relationship a new H-1B petition has to be submitted and approved by USCIS, the simple rolling sum (over a three years time horizon) of approved petitions would overestimate the stock of H-1B workers at a given firm. In order to obtain an estimate of the effective stock, we retrieve data from the Job Openings and Labor Turnover Survey on quits, layoffs, and other separations' rates at the two-digit North American Industry Classification System (NAICS) level, and apply them to each firm's rolling sum of approved petitions over three fiscal years. We obtain a stock of H-1B workers for the fiscal years 2014, 2015, 2016 and 2017[1].

In addition, we also have obtained from USCIS detailed information on workers' wages, education, and occupation for 114,413 H-1B petitions approved in fiscal years 2014 and 2015. Crucially, each observation in our sample specifies the employer sponsoring the worker's petition, which allows us to construct a joint firm-level dataset containing information both on productive inputs (capital, domestic and H-1B labor), as well H-1B's wages.

[1] [Fallick et al., 2006] points out that job-hopping rates in Silicon Valley's computer industry tend to be higher than in the same industry in different geographic areas, which imply that our stock of H-1B workers for such firms may be overstated.

1.2 Related Literature

[Sparber, 2018] is closely related to our work. The paper argues that an alternative distribution method of H-1B visa based on workers' ability would increase output, as well as wages paid to less-educated workers. This study estimates a $26.5 billion gain for the economy over a six year period. The paper estimates a distribution of wage offers from time periods in which demand for H-1B visa was below the congressional cap, and calculates the gain from assigning visa only to highly educated applicants.

There is a large literature that offers estimates of the elasticity of substitution between native and foreign workers using national labor market data for the United States at different levels of schooling and experience with a nested CES production function (see for example [Borjas, 2003] and [Ottaviano and Peri, 2012]).[2] We complement this work by estimating a CES production function using our novel firm-level data.

Given that high skilled immigration is a very important component of innovation and entrepreneurship in the U.S. ([Kerr, 2013]), several papers have investigated the effect of H-1B Visa on patenting and firms' productivity ([Kerr and Lincoln, 2010],[Doran et al., 2015], [Ghosh et al., 2014]), total factor productivity growth in U.S. cities ([Peri et al., 2015b]), labor market outcomes of IT workers in the U.S. ([Peri et al., 2015a]), and access to venture capital funding([Dimmock et al., 2019]). This stream of literature is at least in part motivated by the claim that increasing the number of H-1B visas would lead to gains in productivity for U.S. firms[3]. With our estimate of the distribution of the willingness to pay for an H-1B Visa across employers, we offer a new measure of the actual need for workers in specialty occupations, which complements the existing research in evaluating the former claim.

Finally, [Kerr et al., 2015], [Matloff, 2004] and [Doran et al., 2014] provide an analysis with firm-level data of the crowding out effect of H-1B visa on other workers.

[2] Using national labor market data is not the unique approach used in the literature to estimate the impact of foreign workers on the local labor market. For example, the influential [Card, 1990] exploits the Mariel Boatlift's quasi-natural experiment on Miami's labor market.

[3] *"I want to emphasize that to address the shortage of scientists and engineers, we must do both - reform our education system and our immigration policies. If we don't, American companies simply will not have the talent they need to innovate and compete"*, Bill Gates, Testimony at the U.S. House of Representatives, Committee on Science and Technology, March 12th, 2008

2 Model

We model a firm i's production at time t with the following CES aggregator function:

$$Y_{it} = z_{it} K_{it}^{\alpha_k} \left[b H_{it}^{\rho} + (1-b) D_{it}^{\rho} \right]^{\frac{\alpha_l}{\rho}}$$

H_{it} denotes the amount of H-1B workers hired by the firm, while D_{it} stands for the amount of domestic workers, with total labor input given by $[bH_{it}^{\rho} + (1-b)D_{it}^{\rho}]^{\frac{1}{\rho}}$. The parameter ρ governs the elasticity of substitution between domestic and H-1B workers, ranging between $-\infty$ (perfect complementarity) and 1 (perfect substitution), while b represents the intensity of H-1B workers relative to domestic workers in production. Capital input K_{it} and total labor are aggregated in Cobb-Douglas fashion, with returns to scale respectively given by α_k and α_l. Finally, z_{it} is a firm-specific productivity shock.

In our framework, we allow firms to choose their workforce composition: given a total workforce at time t, they determine how many workers to hire on the domestic and H-1B visa labor market. The timing is illustrated in Figure 1.

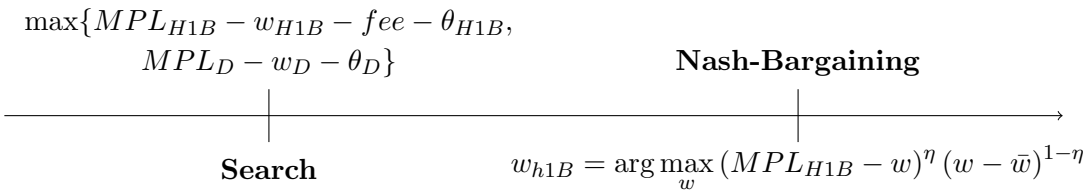
In the first sub-period, firms choose whether to search for a worker in the domestic market or in the H-1B market. In both cases they capture the surplus between marginal product of labor $MPL_i, i \in \{H1B, D\}$, and its cost, given by the wage and search cost, plus the filing fee for H-1B visas.

After this decision, wages for H-1B are determined with Nash-Bargaining, with the workers' outside option given by $\bar{w}$, which we allow to depend on education level and occupation. The bargaining parameters η, which disciplines which share of the total surplus from the match goes to the firm and the worker, varies by industry (which we define as a two-digit NAICS code).

2.1 Estimation

Our identification strategy for the search costs is based on a revealed-preference approach, which is summarized as follows. For given MPL_{H1B} and MPL_D at a given firm, our data allows us to observe hiring choices, which inform us on the difference in search costs $\theta_{H1B} - \theta_D$.

Figure 1: Timing



Note: MPL_{H1B} and MPL_D denote marginal products of labor for H-1B and domestic workforce

For example, suppose that Cognizant (a firm in our dataset) has hired an H-1B System Analyst at $\$65,000$ in 2014. Trivially this choice must have been more profitable than hiring domestic System Analyst, i.e.

$$(MPL_{H1B} - w_{H1B} - fee - \theta_{H1B}) > (MPL_D - w_D - \theta_D)$$

The H-1B worker at cognizant characterized by the highest observed wage will then reveal the difference $\theta_{H1B} - \theta_D$, assuming that Cognizant could have hired additional H-1B workers at a higher wage rate, but chose not to do so. Given MPL_D, MPL_{H1B}, $\theta_{H1B} - \theta_D$, the willingness to pay for an H-1B visa is simply given by

$$(MPL_{H1B} - w_{H1B} - fee - \theta_{H1B}) - (MPL_D - w_D - \theta_D)$$

Next, we proceed to describe the estimation procedure for MPL_i. There is an obvious endogeneity problem, due to the fact that we don't observe firms' productivity. We build a simple instrument: the "surprise number of H1B visa", defined as the difference between observed H1B employment and expected H-1B employment. In particular, we exploit the H-1B lottery years in our sample, and calculate the probability of having an accepted H-1B petition by comparing the amount of LCA submitted in a given fiscal year per firm (taken from a Department of Labor public dataset), and the actual approved petitions.

We jointly estimate the production function, bargaining parameters and workers outside options with the generalized method of moments. The moments Table 1 reports summary statistics for our dataset, while subsequent tables report our estimation results.

Figure 2 and subsequent figures offer a graphical representation of the differential in

Table 1: Summary of Firm-Level Data

Variable	Mean	Median	Std. Dev
Value Added Output ($ Mil)	10,721.1	3,888.9	18,862.9
Materials ($ Mil)	10,228.0	1,228.2	29,049.7
Labor Expense ($ Mil)	3,363.6	1,131.5	6,301.4
Capital ($ Mil)	13,969.5	2,206.7	44,684.7
Employees	60,698.7	17,936.5	162,356.8
Domestic Employees	60,155.24	17,656.5	161,988
Skilled Domestic Employees	7,595.2	1,736	19,106.1
Non-Skilled Domestic Employees	52,560.1	13,784	153,202.6
Foreign Employees	543.5	98	2,288.7
H-1B Visas	322.7	49	1,580.6
Surprise Visas	-33.5	15.2	1,220.3
	Obs: 1,012	Firms: 283	Years: 4

Data is collected from COMPUSTAT. Deflators are based on price indexes from the BEA. The average wage used to calculate labor expenses comes from the BLS.

Table 2: Production Function Estimates - CES

	Specification 1		Specification 2		Specification 3	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
α_k	0.2978		0.2804		0.2750	
α_L	0.6171		0.6265		0.6314	
ρ	0.8930		0.9188		0.9010	
b	0.3166		0.3183		0.3213	

search cost between markets for each firm and occupation.

Figure 2: Figure 2

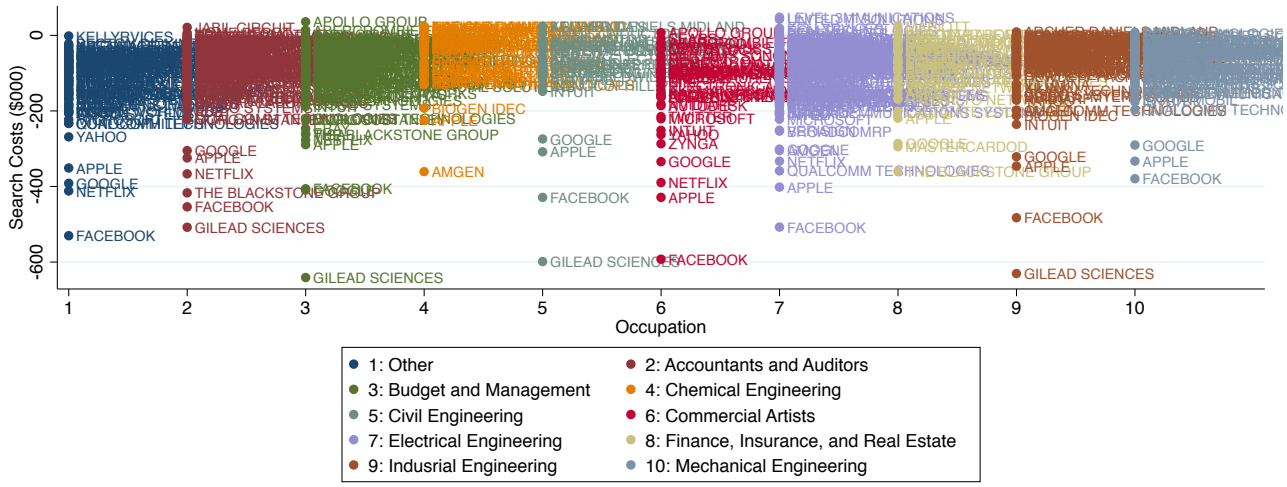


Figure 3: Figure 3

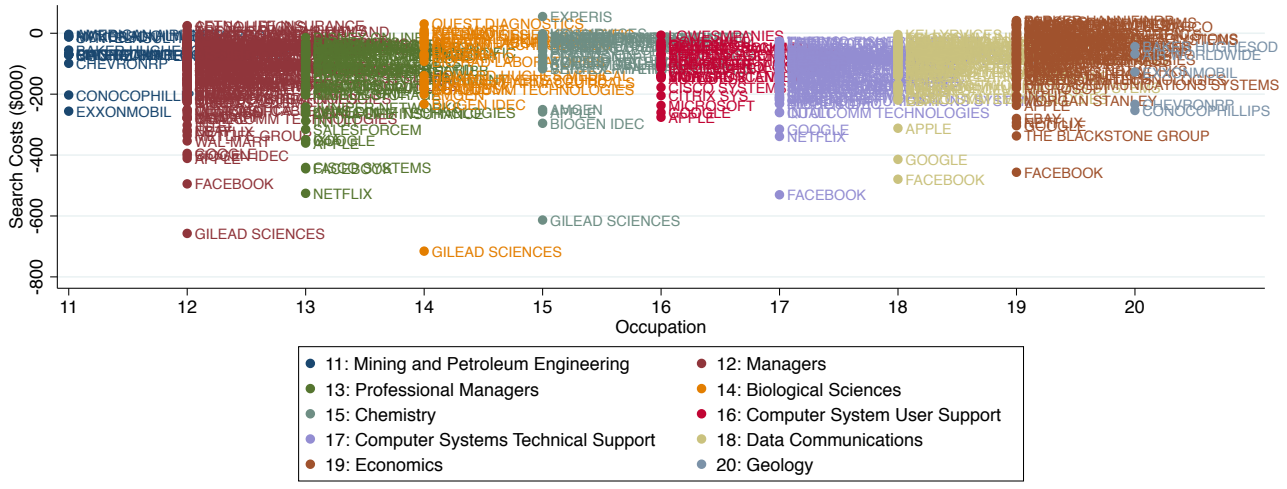


Table 3: Nash Bargaining Parameter Estimates

NAICS Code	Industry	Spec. 1	Spec. 2	Spec. 3
45	Retail Trade (Books, Department Stores, Office Supplies)	0.0051	0.0077	0.0034
33	Manufacturing (Metal, Machinery, Electronics, Furniture)	0.0363	0.0387	0.0301
51	Information	0.0598	0.0590	0.0358
48	Transportation	0.1324	0.1467	0.1353
56	Administrative and Support	0.1422	0.1594	0.1494
44	Retail Trade (Auto, Home, Electronics, Food, Health, Clothing)	0.1559	0.1677	0.1533
52	Finance and Insurance	0.1771	0.1851	0.1758
72	Accommodation and Food Services	0.1805	0.1793	0.1771
54	Professional, Scientific, and Technical Services	0.1929	0.1980	0.1958
21	Mining	0.2213	0.2327	0.2284
31	Manufacturing (Food, Apparel)	0.2239	0.2371	0.2300
11	Agriculture, Forestry, Fishing, and Hunting	0.2334	0.2423	0.2344
23	Construction	0.2355	0.2285	0.2285
49	Warehousing	0.2600	0.2631	0.2467
42	Wholesale Trade	0.2621	0.2755	0.2639
61	Educational Services	0.3202	0.3226	0.3150
62	Health Care and Social Assistance	0.3429	0.3498	0.3424
53	Real Estate Rental and Leasing	0.3748	0.3745	0.3603
32	Manufacturing (Wood, Petroleum, Chemical, Plastics)	0.8280	0.8548	0.8511

The Nash bargaining parameter estimates are presented in ascending order from the industry where firms have the largest bargaining power to the industry where firms have the least bargaining power.

3 Policy Counterfactuals

We simulate a *second-Price Auction*, in which the cost of an H1B is the willingness to pay of lowest bidder. We start from the given firm's employment in year $t = 2014$. Firms draw a match with an H1B worker from the observed distribution of H1B's education and occupation. the firm can either hire her, or hire a domestic worker, whose wage is given by the average wage for that specific occupation, obtained with OES data. Table 6-9 summarize the results.

Figures 5-10 represent the changes in H-1B visa by education, occupation and under the auction mechanism. Table 10 represents the revenue gains under the assumption of perfect substitution between H-1B workers and domestic workers.

Figure 4: Figure 4

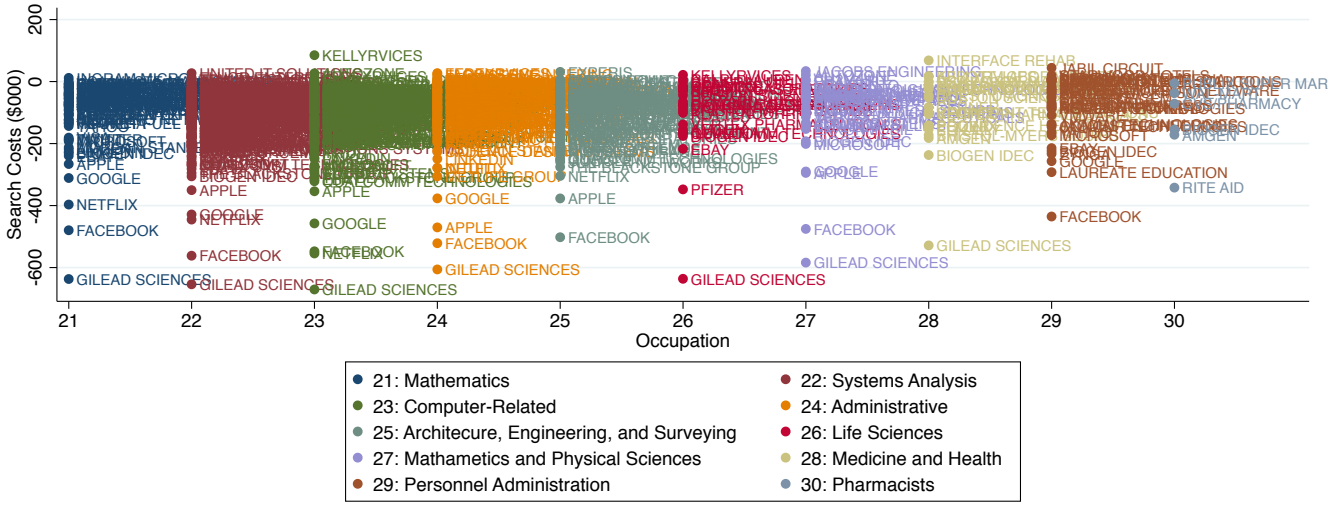


Figure 5

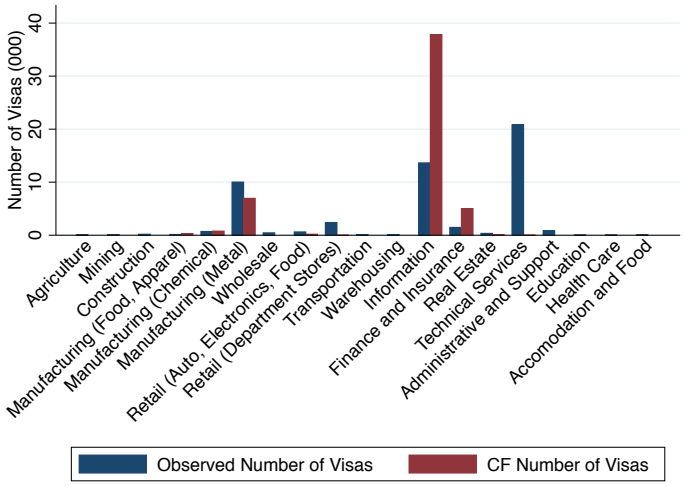


Figure 6

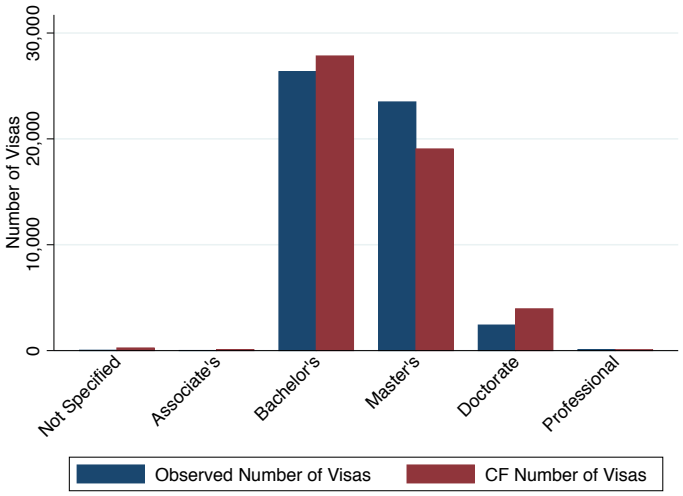


Figure 7

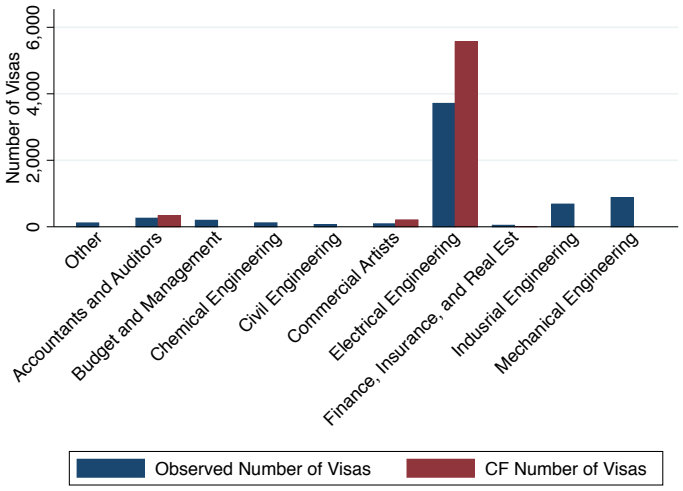


Figure 8

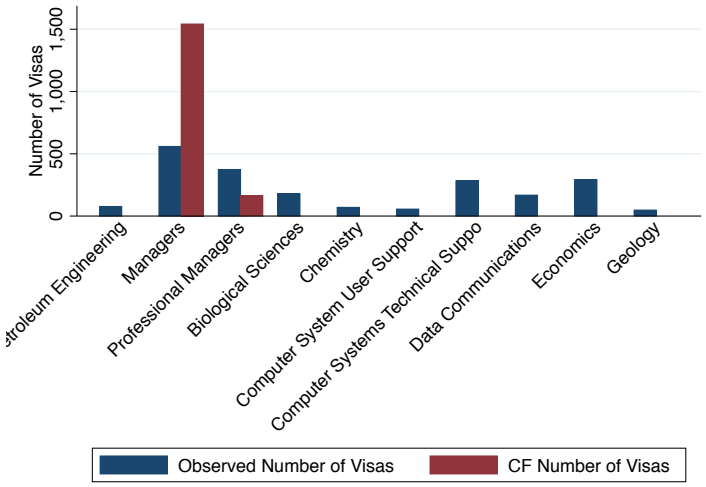


Figure 9

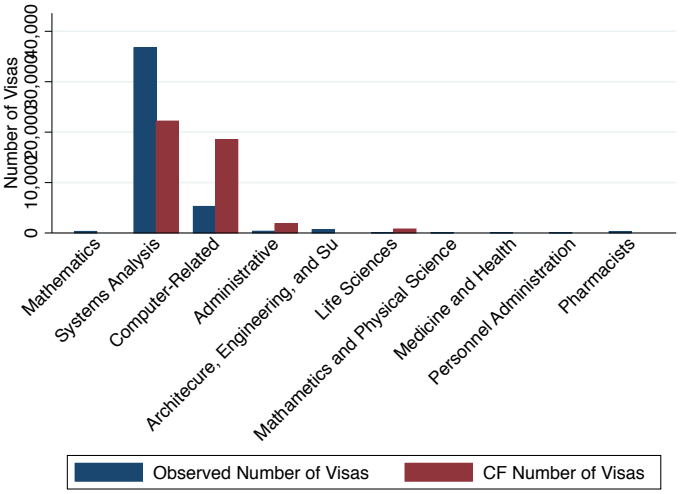


Table 4: Worker Outside Option Estimates: Occupation

Occupation	Spec. 1	Spec. 2	Spec. 3
Finance, Insurance, and Real Estate	191.59	191.74	181.99
Mathematics	185.64	187.91	179.53
Pharmacist	164.59	156.30	148.53
Sales and Distribution Management	156.48	137.46	140.38
Aeronautical Engineering	155.61	132.89	145.30
Personnel Administration	144.38	136.96	133.64
Lawyers	143.14	122.65	125.24
...			
Art	83.17	76.53	78.49
Systems Analysis and Programming	79.80	80.91	80.03
Biological Sciences	79.32	82.36	81.27
Industrial Engineering	66.24	69.13	73.71
Administrative	65.77	73.52	73.57
Inspectors and Investigators	41.46	46.09	42.42
Therapists	25.18	26.98	27.95

Occupation estimates are presented in descending order

Table 5: Worker Outside Option Estimates: Degree

Degree	Spec. 1	Spec. 2	Spec. 3
Not Specified	11.72	11.10	11.41
Associate's	9.37	8.61	8.94
Bachelor's	12.12	11.60	11.90
Master's	13.38	12.74	13.23
Doctorate	12.58	12.37	12.41
Professional	17.02	16.56	16.22

This table shows the estimates for the worker's outside option based on their degree.

4 Conclusion

Table 6: Auction Allocation Results - 2014

Firm	Total Visas	Visa Price ($)	Total Amount Paid ($ Mil)	Total WTP ($ Mil)	Total Surplu ($ Mil)
Alphabet Inc	10394	135,251	1,405.795	1,774.106	368.311
International Business Machines Corp	8820	135,251	1,192.911	1,998.349	805.438
eBay Inc.	7192	135,251	972.723	1,227.642	254.920
Apple Inc	5297	135,251	716.423	1,054.746	338.323
Morgan Stanley	4230	135,251	572.110	655.447	83.337
Adobe Systems Inc	2222	135,251	300.527	380.034	79.507
Microsoft Corp	1854	135,251	250.755	260.067	9.313
Citrix Systems Inc.	1629	135,251	220.323	297.574	77.250
Facebook Inc	1431	135,251	193.544	252.204	58.660
salesforce.com Inc	1414	135,251	191.244	207.836	16.591
QUALCOMM Inc.	1347	135,251	182.183	259.439	77.256
Pfizer Inc	785	135,251	106.172	120.722	14.551
PayPal Holdings Inc	629	135,251	85.073	90.507	5.435
Verizon Communications Inc	616	135,251	83.314	91.548	8.234
Metlife Inc.	584	135,251	78.986	170.400	91.413
Twitter Inc	537	135,251	72.630	79.883	7.254
LinkedIn Corp	390	135,251	52.748	58.942	6.194
Nike Inc	284	135,251	38.411	51.944	13.533
NBCUniversal Media LLC	280	135,251	37.870	41.246	3.375
Comcast Corp	242	135,251	32.731	54.850	22.119
CVS Health Corp	179	135,251	24.210	25.651	1.441
Netflix Inc	132	135,251	17.853	34.381	16.528

This table shows the allocation of visas in 2014 from a simulated auction that uses the minimum by firm-occupation sea cost estimation results.

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Table 7: Change in Number of Visas - 2014

Firm	Observed Number of Visas	Counterfactual Number of Visas	Change
Top 10 CF Increase in Visas			
GOOGLE	1647	10394	+8747
EBAY	444	7192	+6748
IBM	2943	8820	+5877
APPLE	1342	5297	+3955
MORGAN STANLEY	334	4230	+3896
ADOBE SYSTEMS	122	2222	+2100
CITRIX SYS	123	1629	+1506
SALESFORCE	351	1414	+1063
FACEBOOK	528	1431	+903
PFIZER	48	785	+737

This table shows the change in the allocation of visas in 2014 from a simulated auction that uses the mean by occupation search cost estimation results.

Table 8: Change in Number of Visas - 2014

Firm	Observed Number of Visas	Counterfactual Number of Visas	Change
Bottom 10 CF Increase in Visas			
VMWARE	369	15	-354
WAL-MART	431	0	-431
CAPITAL ONE	524	0	-524
CUMMINS	644	0	-644
MICROSOFT	2577	1854	-723
CISCO SYSTEMS	1104	9	-1095
AMAZON	1709	7	-1702
INTEL	1835	52	-1783
SYNTELNSULTING	2637	0	-2637
COGNIZANT TECH SOLUTIONS	16541	0	-16541

This table shows the change in the allocation of visas in 2014 from a simulated auction that uses the mean by occupation search cost estimation results.

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Table 9: Auction Allocation Results - 2014 - Median Search Cost Estimator

Firm	Total Visas	Visa Price ($)	Total Amount Paid ($ Mil)	Total WTP ($ Mil)	Total Surplus ($ Mil)
Microsoft Corp	6527	14,084	91.924	167.762	75.837
Apple Inc	4692	14,084	66.081	197.740	131.660
eBay Inc.	4684	14,084	65.968	309.330	243.362
Cisco Systems Inc	3788	14,084	53.349	102.327	48.978
Alphabet Inc	2794	14,084	39.350	93.355	54.005
Intel Corp	2365	14,084	33.308	77.870	44.562
Morgan Stanley	2317	14,084	32.632	64.156	31.525
salesforce.com Inc	2105	14,084	29.646	59.601	29.955
LinkedIn Corp	1715	14,084	24.154	55.610	31.457
Altaba Inc	1238	14,084	17.436	33.116	15.680
Twitter Inc	1022	14,084	14.394	42.689	28.295
Facebook Inc	923	14,084	12.999	45.381	32.382
Adobe Systems Inc	895	14,084	12.605	24.327	11.722
PayPal Holdings Inc	843	14,084	11.873	31.877	20.004
NVIDIA Corp	741	14,084	10.436	25.078	14.642
VMware Inc	695	14,084	9.788	17.974	8.185
Synopsys Inc	681	14,084	9.591	15.767	6.176
Honeywell International Inc	495	14,084	6.971	11.251	4.280
Avnet Inc	470	14,084	6.619	10.912	4.292
Groupon Inc	407	14,084	5.732	15.099	9.367

This table shows the allocation of visas in 2014 from a simulated auction that uses the median by firm-occupation search cost estimation results.

Table 10: Revenue from Auctioning Visas - Perfect Substitutes

Year	Number of Visas	Observed Price ($)	CF Price ($)	Observed Revenue ($ Mil)	CF Revenue ($ Mil)	Change ($ Mil)	Observed Firms with Visas	CF Firms with Visas
Minimum (5%) Search Cost								
2014	51,284	6,325	82,694	324.371	4,240.867	3,916.496	244	132
2015	48,095	6,325	85,060	304.201	4,090.969	3,786.768	231	126
2016	63,162	6,325	79,510	399.500	5,021.983	4,622.483	217	133
2017	78,801	6,325	75,689	498.416	5,964.385	5,465.968	195	131
No Search Cost								
2014	51,284	6,325	34,277	324.371	1,757.869	1,433.498	244	150
2015	48,095	6,325	35,044	304.201	1,685.434	1,381.233	231	140
2016	63,162	6,325	32,753	399.500	2,068.776	1,669.276	217	141
2017	78,801	6,325	29,716	498.416	2,341.657	1,843.241	195	135

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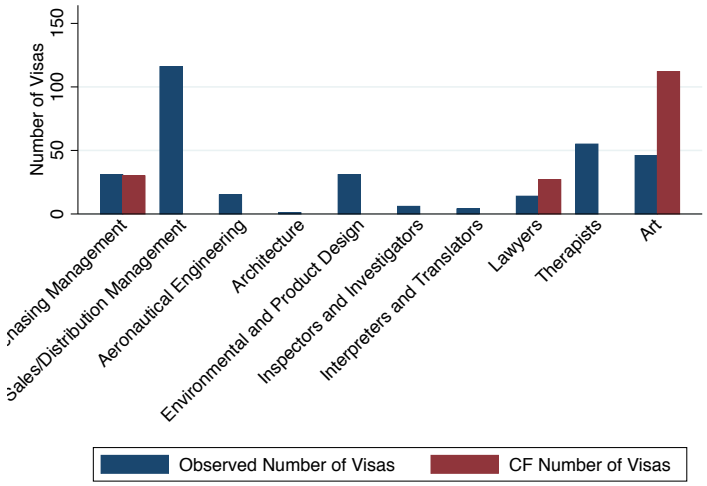
Figure 10



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